REMARKS

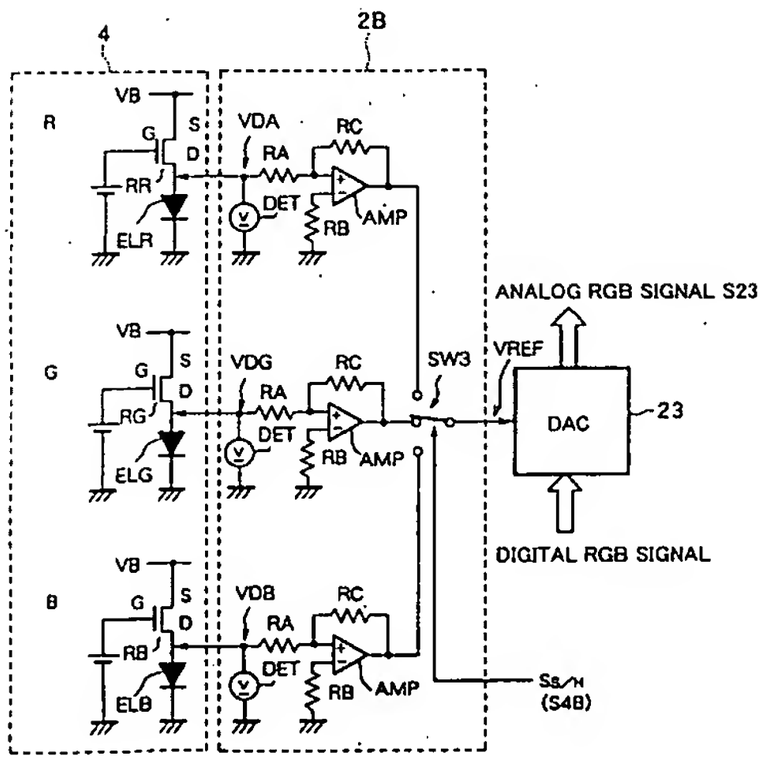
This amendment is responsive to the Final Office Action dated June 24, 2008. Claims 1, 7, 10, 13, and 19 have been amended, and claim 8 has been cancelled; as such, claims 1, 3-7, 9-13, and 15-22 are now pending in this application. Claims 1, 10, 13, and 19 are independent claims. Reconsideration and allowance is requested in view of the claim amendments and the following remarks.

An Example Embodiment

An example embodiment of the present invention is directed to a display device, containing organic EL elements, that compensates for the deterioration of the EL elements over time. As current flows through the organic EL elements, the organic EL elements deteriorate due to heat and the general decline in the organic materials. The example embodiment includes an adjustment information retrieval means 4 for obtaining information regarding the necessary lighting adjustments, which are provided to the level adjustment circuit 2B.

In the embodiment disclosed in Fig. 12, the adjustment information retrieval means 4 contains a series of pixels from each pixel type, in this case RGB pixels. These pixels are driven alongside the pixels of the display device; as such, they deteriorate at the same rate as the pixels of the display device. The Level Adjustment Circuit 2B monitors the deterioration of the pixels in the adjustment information retrieval means 4 by measuring the voltage difference between the two ends of the pixel elements (ELR, ELG, ELB). Based on the identified voltage difference, the Level Adjustment Circuit 2B determines the necessary adjustment to make to the corresponding colored pixels in the display.

FIG. 12



Rejections under 35 U.S.C. § 102/103

Claims 1, 3-7, 13, 15, and 16 have been rejected under 35 U.S.C. § 102 over U.S. Patent No. 6,765,551 to Nakano et al. ("Nakano"); claims 9 and 18 have been rejected under 35 U.S.C. § 103 over Nakano; claims 8 and 17 are rejected under 35 U.S.C. § 103 over Nakano in view of U.S. Patent No. 6,774,578 to Tanada et al. ("Tanada").

Claim 1 recites: *an image display device, comprising:*

a circuit for generating drive signals from an input image signal ;

a plurality of pixels including a light emitting element for emitting light of a predetermined color of red , green or blue by being applied with said drive signal supplied for each color from said circuit ;

an adjustment information retrieve means for obtaining information relating to light emission adjustment proportional to the deterioration of said light emitting element;

a level adjustment circuit provided in said circuit , for changing a level of an RGB signal before dividing said drive signals to respective RGB colors based on said information obtained by said adjustment information retrieve means; and wherein

said level adjustment circuit changes a level of a direct current voltage supplied to said circuit, proportionally to account for the deterioration of a luminance of said light emitting element.

A. Nakano

Nakano discloses a column electrode driving circuit including a reference voltage generations circuit that adjusts the chromaticity of the display as the display changes between 64 grayscale levels of luminance. Nakano recognizes that as the chromaticity of the display screen changes, different colors come to dominate the display. Chromaticity refers to the intensity of the color displayed by the LCD device, for example bright images have a different chamaticity than grayer images, which have a lighter chramaticity than dark images. Nakano recognizes that as the chromaticity gets lighter, blue colors begin to dominate the display. This phenomenon is a characteristic of LCD devices; for each luminance level a certain color may be more pronounced.

By adjusting the reference voltages for each of the different colored pixels at each level of grayscale (i.e., chromaticity) it is possible to ensure that each of the RGB values is uniformly

pronounced in every grayscale/chromaticity level, and that no color dominates the display at a given chromaticity.

Nakano does not need to monitor for pixel deterioration, particularly because Nakano is not addressing issues relating to pixel deterioration. Instead, Nakano only monitors the intended chromaticity of the colors input to the LCD device and adjusts the colors based on the bit correction principle illustrated in Fig. 2 and explained in col. 5, l. 56 to col. 6, l.10 of Nakano. Nakano accomplishes this by providing a reference voltage generation circuit 7, which provides modified voltage values for each chromacity setting for each LCD color. Using the input color values provided to D/A converter 50, the D/A converter 50 selects the corresponding modified voltage values from reference voltage generation circuit 7.

FIG. 1

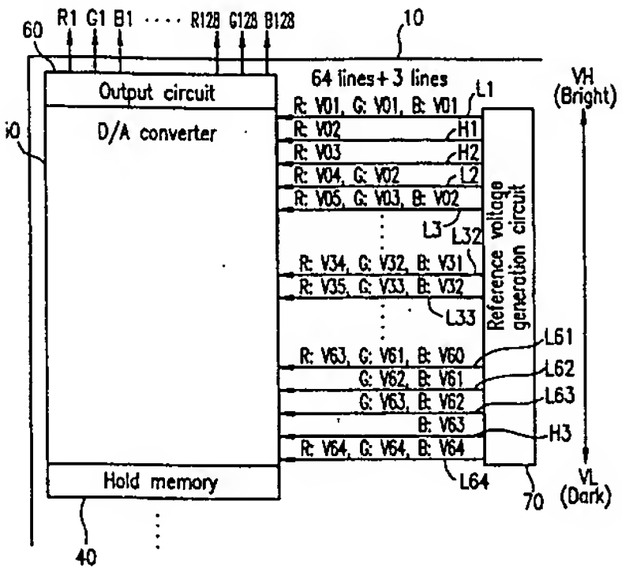
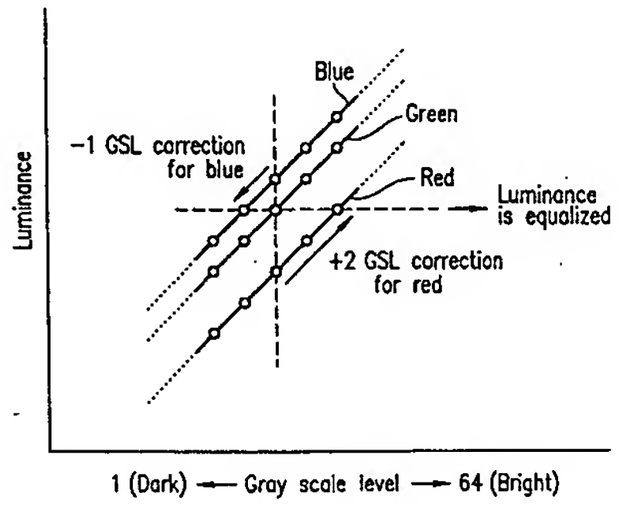


FIG.2



First, Nakano does not teach or suggest "*an adjustment information retriev[al] means for obtaining information relating to light emission adjustment proportional to the deterioration of said light emitting element.*" Nakano does not address issues pertaining to the deterioration of organic luminance devices. Nakano does not monitor or respond to the effects on the RGB values resulting from the deterioration of EL elements. Furthermore, since Nakano does not address EL element deterioration, Nakano does not include a mechanism for monitoring the deterioration of the EL elements.

The Office Action attempts to define the concept of pixel deterioration, by claiming that pixel deterioration is the same as change in chromaticity. More simply, the Office Action defines "deterioration" as the display of bright colors versus the display of dark colors. The Office Action recites:

> Nakano recognizes that if any voltage-driven display device has different applied voltage-luminance characteristics for each of red, green, and blue, then any shift in the luminance ofan achromatic display screen from a brighter state to a darker state might result in a varying chromaticity (Nakano, col. 3, 11. 4-10). To cure this problem, Nakano sets out to improve the color displaying performance of a display by ensuring consistency among the luminance values for the respective colors of ROB (Nakano, col. 3, 11. 29-32). The disclosure of Nakano provides that a color balance can be maintained despite changes in the luminance of displayed images (Nakano, col. 9, 11. 11-15). Nakano achieves this by obtaining information related to light adjustment proportional to the transition of a bright state to a dark state in a light emitting element for each color (Nakano, col. 6, 1. 64 - col. 7, 1. 43).
>
> Regarding the claim limitation in dispute, one accepted definition for the term"deterioration" is "to weaken" (The American Heritage College Dictionary, Fourth Edition, 2002). As one of ordinary skill in the art would appreciate from Nakano, transitioning from a bright state to a dark state in a light emitting element (Nakano, col. 3, 11. 4-10) corresponds to a weakening of that light emitting element's luminosity. Thus, examiner respectfully submits that Nakano is a fair teaching of "obtaining information related to light adjustment proportional to the deterioration of the light emitting element" (i.e., the deterioration of the light emitting element being the transition from a bright state to a dark state for each color), as claimed. Moreover, examiner respectfully submits that the claims as presented are absent any language that would preclude such an interpretation.

Contrary to the position in the Office Action, the claims recites "*deterioration of said light emitting element.*" The position that *the intentional "weakening" of light intensity to display a darker color, is equivalent to the deterioration of the light emitting element* is an intentional misinterpretation of the recited claim. This position is comparable to stating the deceleration of a vehicle is the same as the deterioration of the engine. The two differ because the intentional weakening of the light is distinct from the damage over time to the light emitting device.

As such, Nakano cannot form the basis for a rejection under 35 U.S.C. §102 for claim 1. For similar reasons, Nakano cannot form the basis for a rejection under 35 U.S.C. §102 for claim 13. Claims 3-7, 9, 15, 16 and 18 depend on claims 1 and 13, and therefore are also overcome Nakano.

Accordingly, Applicant respectfully requests that the rejection of claims 17 under 35 U.S.C. § 103(a) over Nakano be withdrawn.

B. Tanada

Tanada discloses a device for detecting and accounting for EL degradation by detecting the variance in luminance on a pixel-by-pixel basis. Tanada employs photoelectric elements 106 which are each positioned on a separate pixel 107 of the display device. This allows each photoelectric element 106 to monitor a given pixel 107, which in turn allows the system to properly adjust the intensity of the pixels. Each photoelectric element 106 monitors the actual light output of the pixels. The system operates by making corrections based on a test pattern provided in unit 103. Memory circuit 104 stores the brightness results, and the data brightness correction is stored in correction data storage portion 102. In the background, Tanada also discusses how previous attempts to account for pixel deterioration included using a timer to track how long the display device was in use, and thereby predict the expected pixel deterioration based on experimental results.

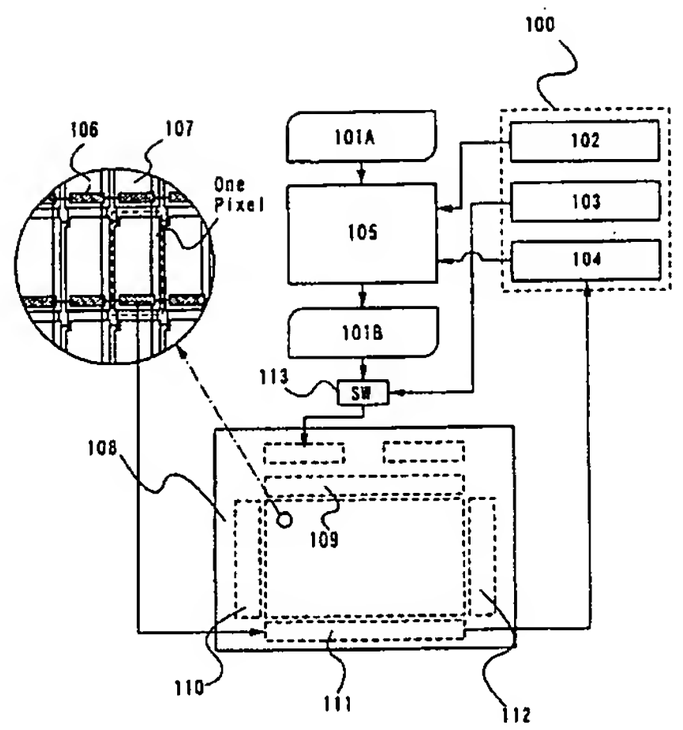


Fig. 1

Tanada does not teach or suggest "*said adjustment information retriev[al] means and said level adjustment circuit further compris[es]: a plurality of pixels, including pixels for at least each respective RGB color; a detection means for detecting a changing value corresponding to the luminance of the plurality of pixels by measuring the voltage between the ends of each of the at least one pixel.*"

While Tanada does address issues pertaining to LCD pixel deterioration, the mechanisms employed to monitor the pixel deterioration are completely different from those claimed. Tanada discusses measuring time lapses or, alternatively, photoelectric monitoring to track pixel deterioration. In the time lapse instance, Tanada simply discusses monitoring how long the LCD has been running and assumes a certain deterioration based on this time measurement. In the

photoelectric monitoring instance, Tanada is actually measuring the light output from each pixel, which requires using a photoelectric device positioned on each pixel. Neither of these mechanisms is similar to the mechanism recited in independent claim 1.

Claim 1 recites "*a detection means for detecting a changing value corresponding to the luminance of the plurality of pixels by measuring the voltage between the ends of each of the at least one pixel.*" Tanada does not detect the pixel deterioration based on a voltage measuring between the ends of a pixel, but instead employs distinctly different light output measuring elements.

As such, Tanada does not cure the deficiencies of Nakano with respect to claim 1. For similar reasons, Tanada does not cure the deficiencies of Nakano with respect to claim 13.

Even assuming, arguendo, that Nakano and Tanada were combinable, Applicant submits that none of the cited references either alone or in any proper combination, cure the deficiencies of Nakano with respect to at least the previously identified features of claims 1 and 13. Accordingly, Nakano and Tanada cannot form the basis for rejected any of claims 1, 3-7, 9, 13, and 15-18.

Accordingly, Applicant respectfully requests that the rejection of claims 17 under 35 U.S.C. § 103(a) over Tanada be withdrawn.

Second Example Embodiment

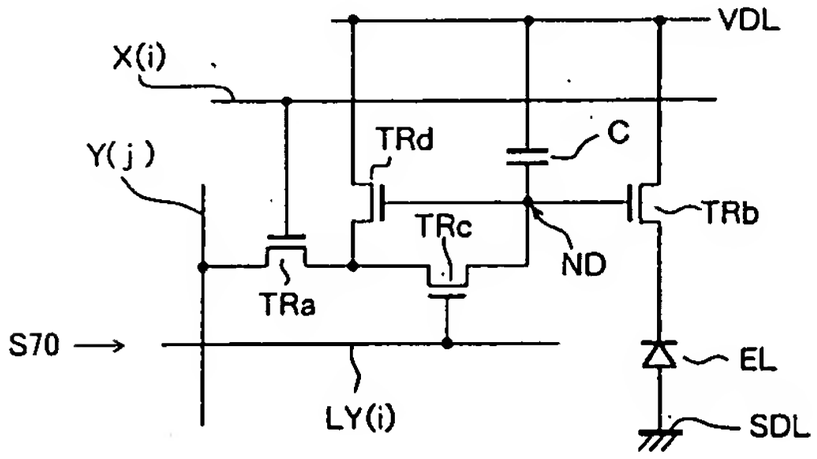


Fig. 18 (left) of the specification illustrates a pixel in accordance with the present invention. The pixel includes a pair of drive signals X(i) and Y(j). The drive signals provide a voltage to transistor TRc driven by signal LY(i) from the duty ratio circuit. Node ND, and transistors TRc and TRd produce a loop circuit, whereby once a voltage is provided to ND via transistor TRc, voltage from VDL will continue to flow through ND, TRd, and TRc, so long as TRc is kept in a conducting state. Furthermore, so long as this voltage keeps flowing transistor, TRb will continue to provide voltage to light emitting element

EL. Simply stated, once the EL element is lit by on signals X(i), Y(j), and LY(i), the EL will continue to remain illuminated until LY(i) deactivates TRc, regardless of signals X(i) and Y(j).

Rejections under 35 U.S.C. § 103

Claims 10-12 and 19-22 are rejected under 35 U.S.C. § 103 over Nakano in view of U.S. Patent No. 6,982,686 to Miyachi et al. ("Miyachi").

Claims 10 recites: *[a]n image display device, comprising:*
a circuit for generating drive signals from an input image signal ; and
a plurality of pixels including a light emitting element for emitting light of a predetermined color of red , green or blue by being applied with said drive signal supplied for each color from said circuit;
wherein said circuit comprises
a motion detection circuit for detecting motions by said image signal;
a level adjustment circuit for changing a level of an RGB signal before divided to said drive signals for the respective RGB colors based on a result of the motion detection obtained from said motion detection circuit; and
a duty ratio adjustment circuit for changing the duty ratio of a light emission time of said pixels based on the motion detection result;
and wherein the plurality of pixels each comprise a light emission control circuit whereby once the pixel receives a drive signal, the light emitting element continues to draw on a voltage source while receiving a signal from the duty ratio adjustment circuit.

Miyachi discloses a method and apparatus for managing the light intensity of cold-cathode tubes in LCD monitors. Particularly, the cited elements of Miyachi are directed to a system for managing the illumination produced by cold-cathode tubes based on the motion present in a video signal. In Fig. 42, a video signal is input to liquid crystal panel control circuit 804. Control circuit 804 produces three output signals, two output signals for controlling the liquid crystal panel 805, and one output signal for controlling inverter control circuit 801. Inverter control circuit 801 controls cold-cathode tube 803, via Inverter 802. No signal is passed to the liquid display panel 805 for controlling the cold-cathode tube. Instead, an external circuit, i.e. inverter circuit 801, dims the cold-cathode tube.

The Office Action admits that Nakano does not teach or suggest "*wherein said circuit comprises a motion detection circuit for detecting motions by said image signal; a level adjustment circuit for changing a level of an RGB signal before divided to said drive signals for the respective RGB colors based on a result of the motion detection obtained from said motion detection circuit; and a duty ratio adjustment circuit for changing the duty ratio of a light emission time of said pixels based on the motion detection result.*" The Office Action relies on Miyachi for these teachings.

Applicant submits that Miyachi does not teach, suggest, or render obvious "*wherein the plurality of pixels each comprise a light emission control circuit whereby once the pixel receives a drive signal, the light emitting element continues to draw on a voltage source while receiving a signal from the duty ratio adjustment circuit,*" as recited in independent claim 10.

Miyachi is directed to LCD devices that employ backlighting to attain luminescence. While Miyachi mentions that the emitters disclosed may include emitting diode or other LEDS, Miyachi provides no explanation of basis for how to implement such a device based on the disclosed teaching. Miyachi simply provides a list of potential technologies without form or basis for how to employ the disclosed inventions with respect to those technologies.

Accordingly, Miyachi fails to teach or suggest "*wherein the plurality of pixels each comprise a light emission control circuit whereby once the pixel receives a drive signal, the light emitting element continues to draw on a voltage source while receiving a signal from the duty ratio adjustment circuit.*"

Even if Nakano and Miyachi were combinable (which applicant does not admit), the combination still fails to render independent claim 10 obvious. Neither reference provides the motivation to teach or suggest the features of claim 10. For similar reasons, independent claim 19 is neither disclosed, suggested, nor rendered obvious by Nakano and Miyachi (although claims 10 and 19 should be interpreted solely based upon the limitations set forth therein).

Furthermore, at least for the reason disclosed above, claims 11, 12, and 20-22 overcome the combination of Nakano and Miyachi because they depend on independent claims 10 and 19.

CONCLUSION

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. SON-2839 from which the undersigned is authorized to draw.

Dated: September 22, 2008

Respectfully submitted,

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